Nov. 5, 1968 W. S. BACHMAN ET AL 3,409,190

BOWMAKING MACHINE

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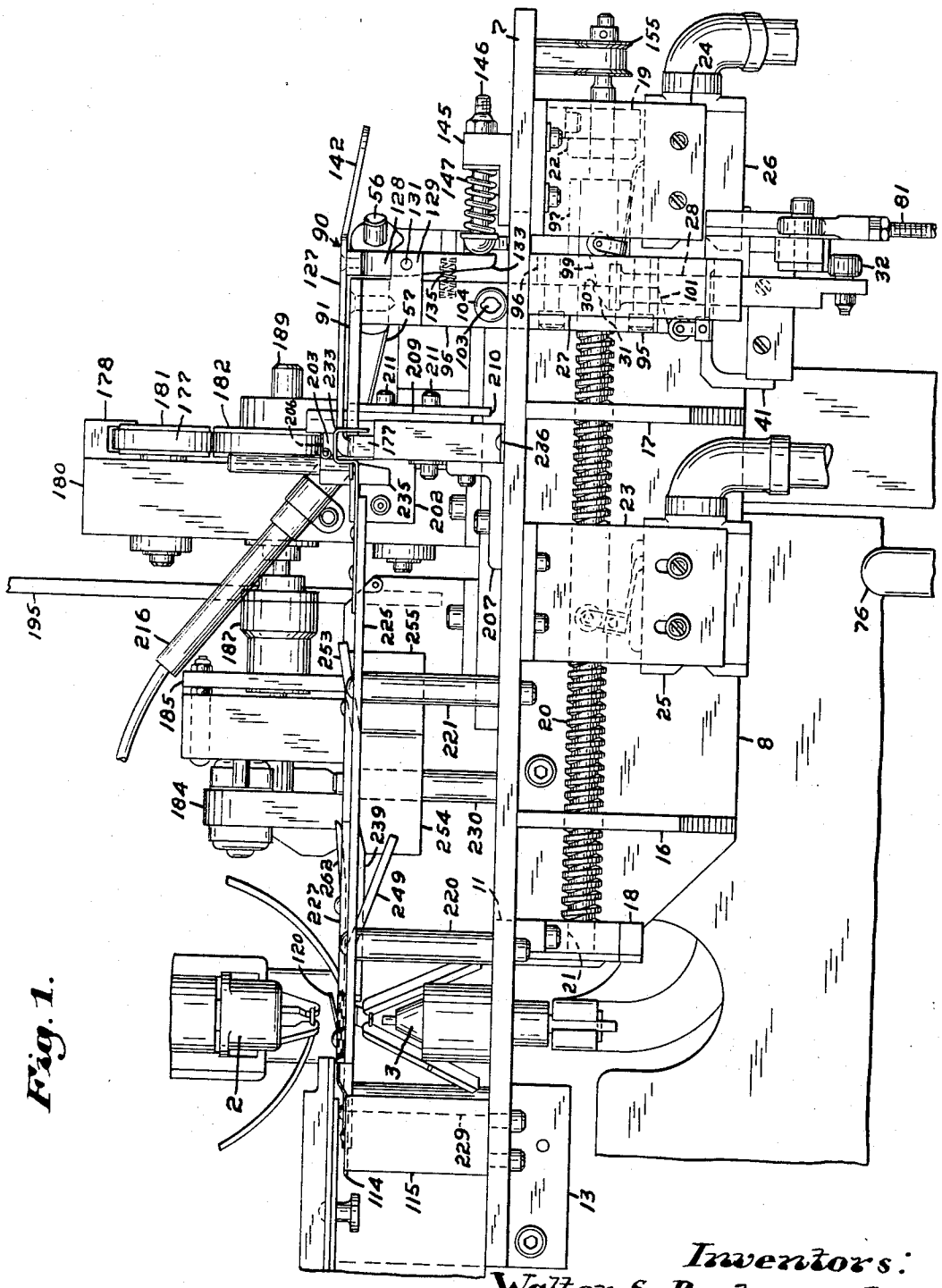

Fig. 1.

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BOWMAKING MACHINE

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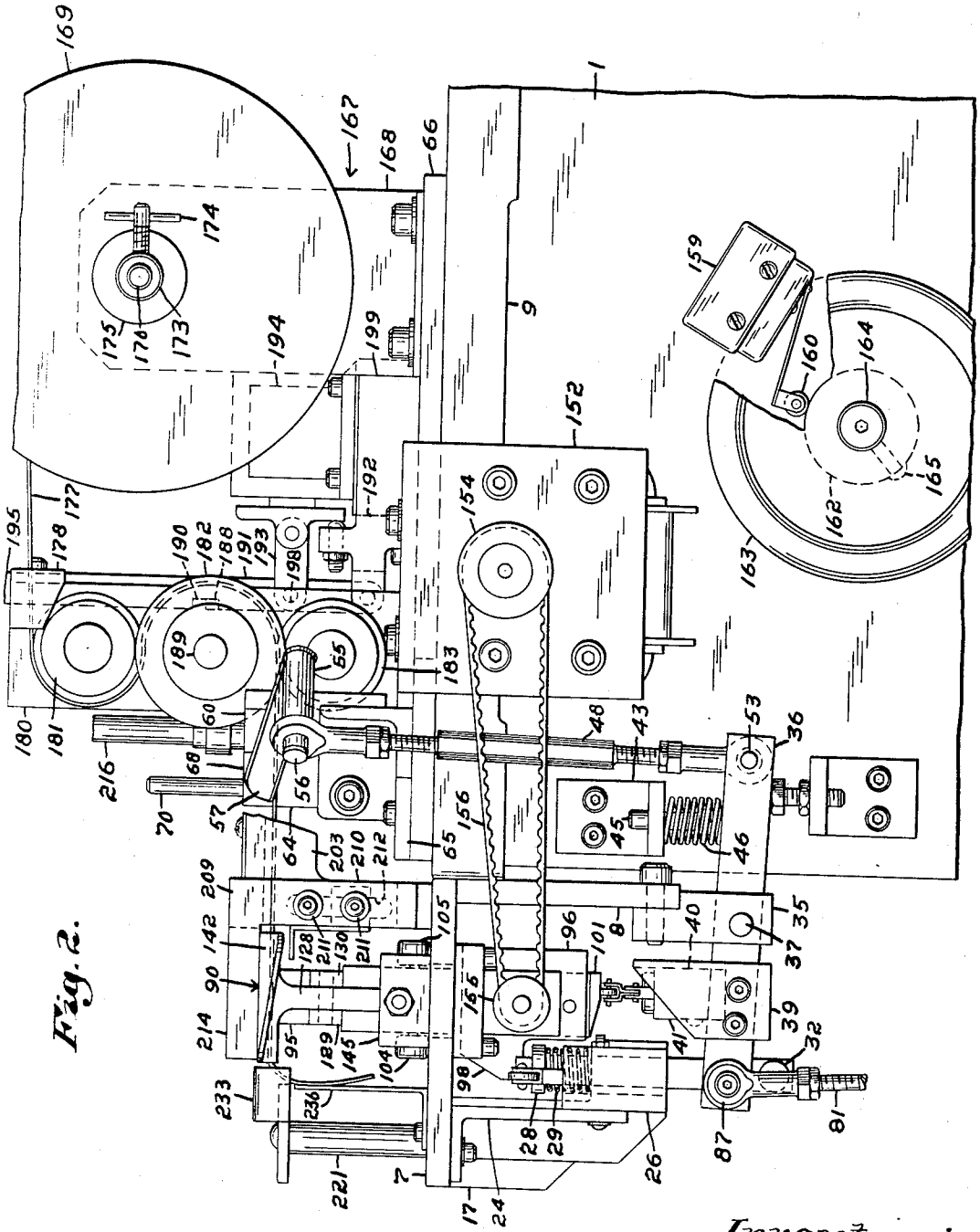

Fig. 2.

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BOWMAKING MACHINE

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Fig. 3.

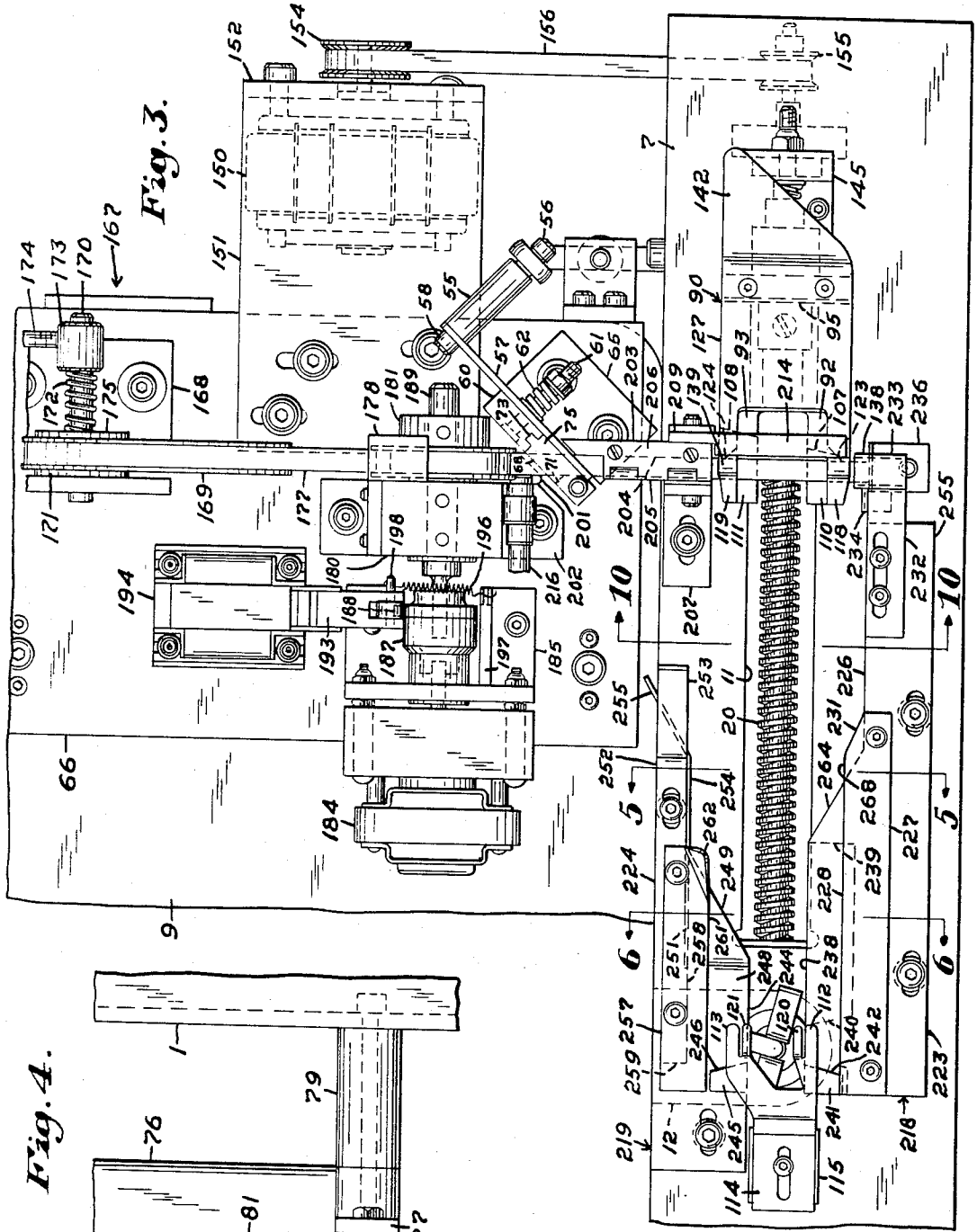

Fig. 4.

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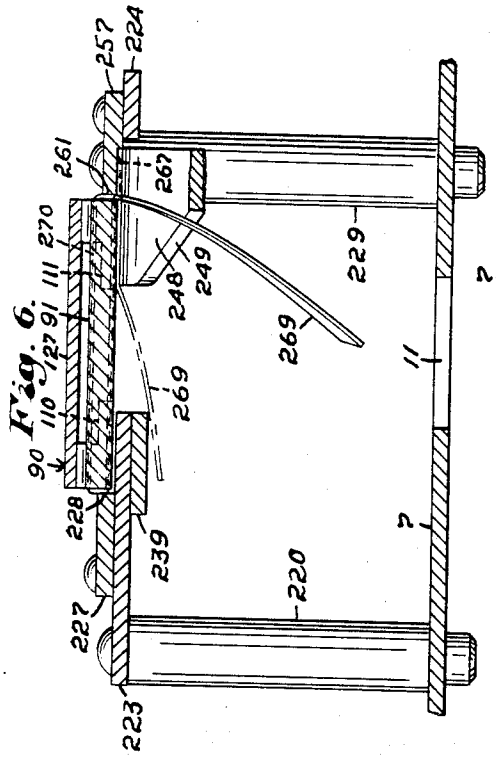

Fig. 6.

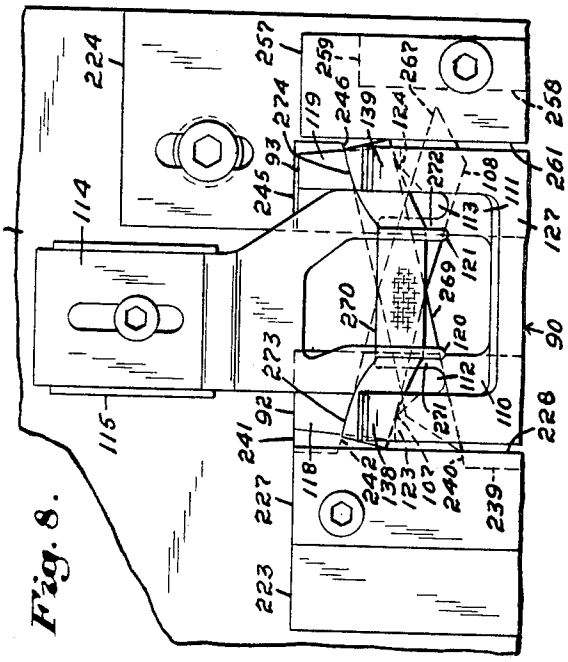

Fig. 8.

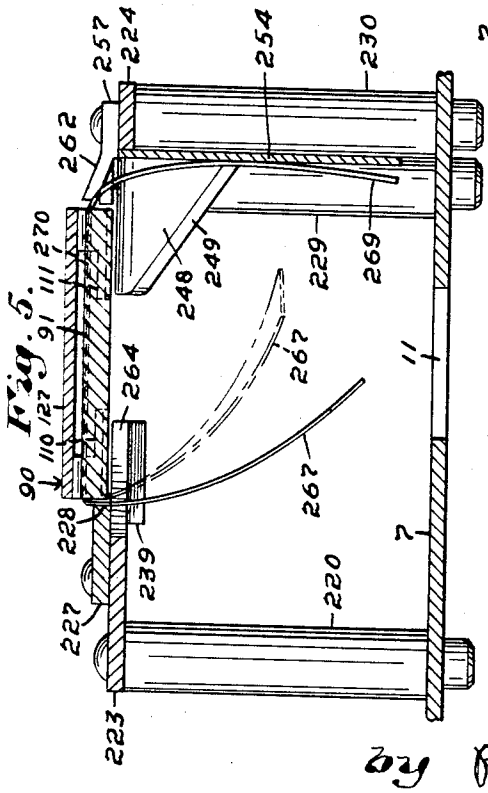

Fig. 5.

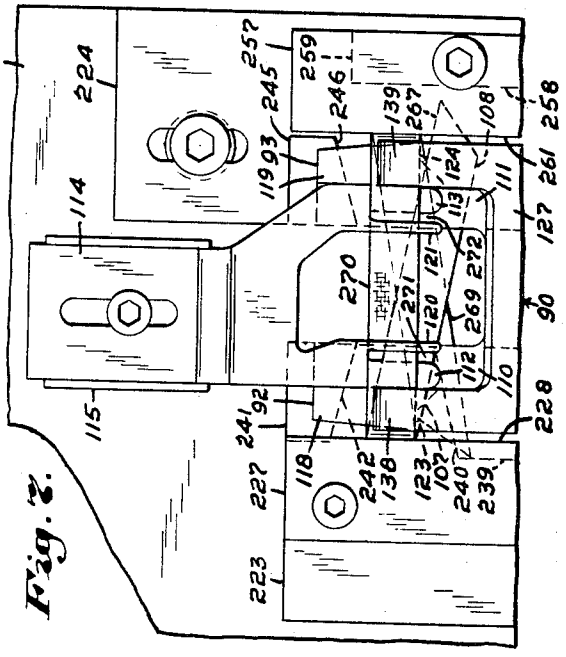

Fig. 7.

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BOWMAKING MACHINE

Filed March 4, 1965 6 Sheets-Sheet 5

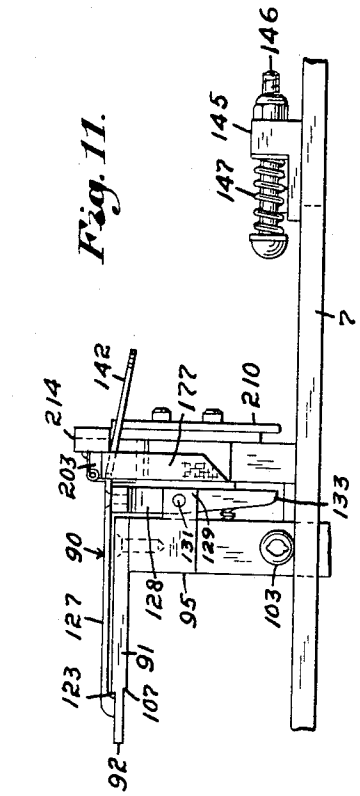

Fig. 11.

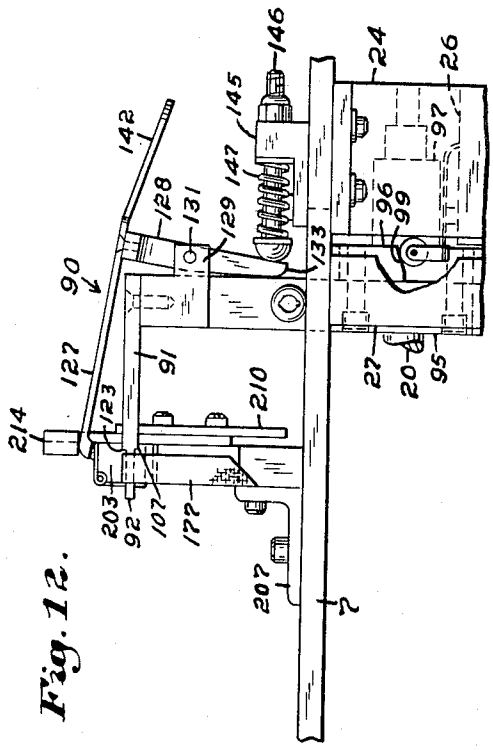

Fig. 12.

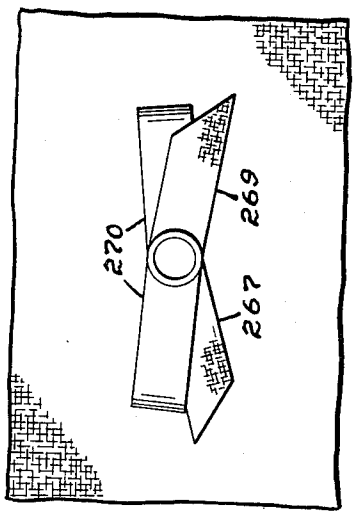

Fig. 9.

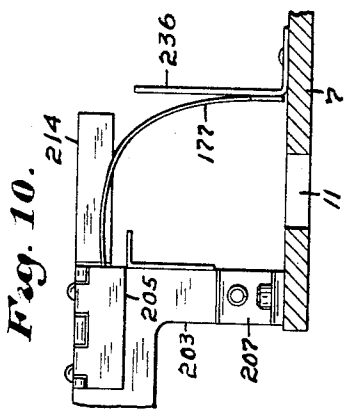

Fig. 10.

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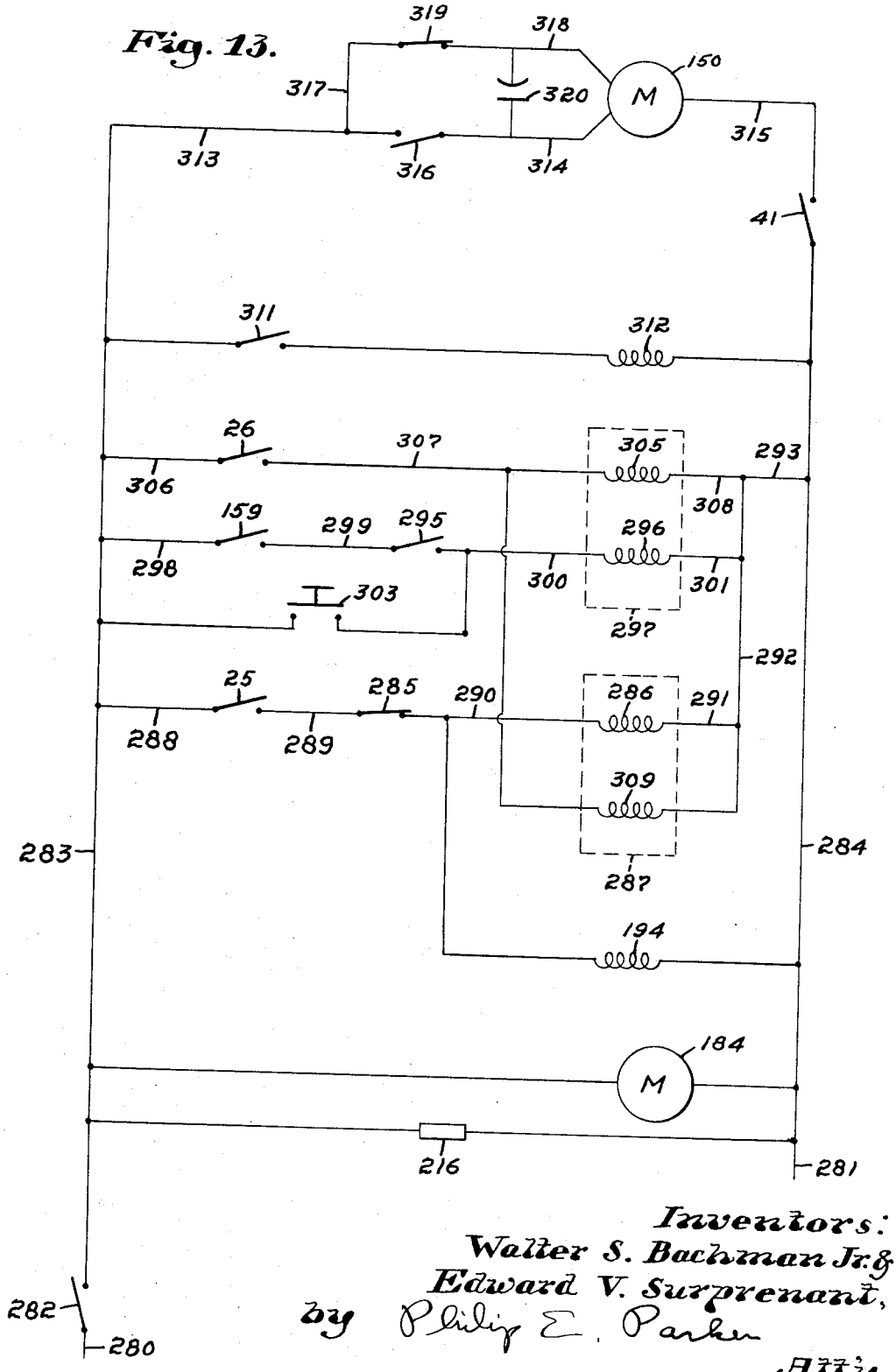
BOWMAKING MACHINE

Filed March 4, 1965 6 Sheets-Sheet 6

Fig. 13.



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United States Patent Office 3,409,190 Patented Nov. 5, 1968

3,409,190

BOWMAKING MACHINE

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Filed Mar. 4, 1965, Ser. No. 437,091
18 Claims. (Cl. 223—46)

ABSTRACT OF THE DISCLOSURE

A bow forming apparatus has a stationary housing and a ribbon holding and transporting carriage mounted on the housing for linear, reciprocating travel with respect to the housing between first and second stop positions. The housing and carriage have interacting, generally planar facing surfaces which cooperate to fold the ribbon into a bow configuration as the carriage travels from the first to the second stop position. A ribbon feeding device located adjacent the first stop position feeds a predetermined length of ribbon across the path of travel of the carriage. The ribbon feeding device is actuated by the carriage as it travels toward the second stop position. Thus another length of ribbon is in position to be picked up by the carriage on its return to the first stop position. A fastener attaching device is located adjacent the second stop position for securing the folded ribbon in a bow configuration. The apparatus also includes a carriage driving means, a first control means actuated by an operator for initiating movement of the carriage from the first to the second stop position, and a second control means actuated by the fastener attaching means for initiating return movement of the carriage to the first stop position.

This invention pertains to bowmaking devices and aims to provide such a device with co-operating means for securing the parts of each bow together at or near the center which is entirely novel and a definite advance in the art. Such co-operating means need not necessarily be employed, however inasmuch as the parts of each bow may also be secured together at or near the center by an independent, portable hand device or means.

Objects besides the above general one and the important accomplishments and features of the invention will appear upon reading the following detailed description in conjunction with the accompanying drawings in which:

FIG. 1 is a fragmentary front elevational view of a fastener attaching machine provided with a bowmaking device according to the present invention, said device being shown in its rest condition;

FIG. 2 is an end elevational view of the same as seen from the right in FIG. 1;

FIG. 3 is a fragmentary top plan view of the same taken below the punch assembly of the fastener attaching machine;

FIG. 4 is a fragmentary, end elevational view as seen from the right in FIG. 1 showing a lower linkage portion of the device;

FIG. 5 is an enlarged, fragmentary cross-sectional view taken on the vertical plane 5—5 in FIG. 3 and in the direction of the arrows when the carriage has moved the center of the ribbon to this plane;

FIG. 6 is a view like FIG. 5 taken on the vertical plane 6—6 in FIG. 3, in the direction of the arrows when the carriage has moved the center of the ribbon to this plane;

FIG. 7 is an enlarged, fragmentary top plan view of said device when the carriage is near the end of its forward movement;

FIG. 8 is a view like FIG. 7 but showing the carriage in its extreme forward position;

FIG. 9 is a top plan view of a bow produced by said device shown fastened to a piece of fabric, which bow and fabric have been turned over after the fastening operation;

FIG. 10 is a fragmentary, cross-sectional view taken on the vertical plane 10—10 in FIG. 3 and in the direction of the arrows when the carriage is in its forward position;

FIG. 11 is a fragmentary, front elevational view of said device as the carriage is moving rearwardly and the ribbon is passing along the upper surface of the top plate thereof;

FIG. 12 is a view similar to FIG. 11 but showing the carriage in the extreme rearward position thereof; and

FIG. 13 is a schematic wiring diagram of the electrical system of said bowmaking device when the carriage is in the rest position.

Referring to the drawing figures in detail, the reference numeral 1 designates the supporting structure of a conventional type of fastener attaching machine which structure extends down to and rests on the floor. The machine includes the usual attaching punch and die assemblies 2 and 3, respectively, for the attachment of the two parts of a fastener combination to each other and to the interposed work upon the machine being operated for one cycle by the pushing of a foot treadle by the worker operating the machine. The fastener combination parts in this instance are preferably pronged rings and sockets.

The bowmaking device comprises a horizontal table 7 and a depending plate 8 welded thereto at the rear which table and plate unit extend longitudinally along the front edge of the top 9 of the supporting structure of the fastener machine being secured thereto by means of screws. The table 7 is provided with a longitudinally extending slot 11 therethrough and also a cutout 12 near the front for the die assembly 3 of the fastener attaching machine. A depending plate 13 is welded to the table 7 at the rear thereof in line with the plate 8 which plate 13 is secured to the top 9 of the fastener machine by means of a screw for further securement of the table 7 to said top 9 of the mastener machine. The table 7 is supported at the front by a pair of brackets 16 and 17 welded thereto and to the plate 8.

A pair of bearing blocks 18 and 19 are mounted on the table 7 which blocks journally receive opposite shaft portions 21 and 22 of a longitudinal, threaded shaft 20, the axis of which is parallel to said table and the longitudinal center line of the slot 11 therein. A pair of brackets 23 and 24 are also mounted on the table 7, which brackets in turn mount normally open limit switches 25 and 26. Another bracket 27 is secured to the table 7 and mounts a reciprocally, vertically movable spring loaded stop member 28 for a purpose to be brought out below. The coil spring of this member which normally retains the member in the uppermost position is identified by the number 29 while the stop surface of the member is identified by the number 30, the back side of the stop member at the top being a cam surface 31. The lower end of the stop member is provided with a roller 32.

The depending back plate 8 mounts a pivot block 35 (see FIG. 2) upon which a transversely extending lever 36 is pivotally supported by means of a pin 37 extending through the member 35. A bracket 39 having a leg 40 is mounted on the lever 36. A normally closed limit switch 41 is in turn mounted on the leg 40 of the bracket. An angle iron bracket 43 is secured to the end of the supporting structure of the attaching machine through the outstanding flange of which passes a bolt 45 sur-

rounded by a coil spring **46** which bears against the upper surface of the lever **36** and bottom of said flange.

A link assembly **48** is pivotally supported on the inner end of the lever **36** by a cap screw **53**. The upper end of the assembly **48** is pivotally connected to a spacing member **55** by means of a cap screw **56** which spacer in turn is fixedly secured to a knife **57** by means of a cap screw **58**. The knife is pivotally mounted on a block member **60** by means of a nut and bolt combination **61**, the knife being resiliently retained against the block **60** by means of a coil spring **62** positioned on the bolt between the knife and nut. The block **60** is of L shape having a lower forwardly extending portion **64** having in turn an upper horizontal surface across its length. The block **60** is supported on an angle iron bracket **65** which in turn is secured to a plate **66** which is attached to the flat, horizonal top **9** of the attaching machine supporting structure.

A forward, ribbon hold-down member **68** is normally secured to the portion **64** of the block **60** by means of a manually rotatable threaded member **70** threadedly received within the portion **64**. The member **68** has a depending portion **71** at the front thereof which rests on the upper surface of the portion **64** of the block **60**. The rest of the member **68** is uniformly spaced from the upper surface of the portion **64** for the passage of the ribbon through the slot **75** thus formed between the member **68** and portion **64** of the block **60**. The width of the slot is substantially equal to that of the ribbon passing therethrough. A rearward, vertically extended rib **73** of the member **68** is received within a slot of block **60** when such member is secured to the block as can be observed in FIG. 4. The hold-down member **68** can accordingly be slipped upwardly and downwardly within said slot of the member **60** when the member **70** is turned up. The outwardly facing surfaces of the block **60** and member **68** are flush with each other for movement of the knife **57** over these combined surfaces in both the downward and upward directions.

A padded knee lever **76** having a rearward extension **77** is pivotably mounted on a shouldered screw **78** which passes through a portion of the supporting structure of the fastener attaching machine, being retained thereon by a nut. A tubular spacer **79** is existent between the hub portion of the lever **76** and said portion of the machine. A link assembly **81** is pivotably connected at the bottom to the arm **77** of the lever **76** by means of a cap screw and nut combination **85** and at the top to the lever **36** by means of a cap screw and elastic stop nut combination **87**. Movement of the lever **76** to the right as seen in FIG. 1 by a person's knee will cause counterclockwise pivotal movement of the lever **36** by downward movement of the link **81**. This action applies downward force to the roller **32** of the mechanical stop member **28** which moves said member downwardly against its coil spring **29** for a purpose which will appear hereinafter. Said pivotal movement of the lever **36** also causes the limit switch **41** to swing down and electrically close for a purpose which will be covered hereinafter. Said movement of the lever **36** as the result of the above-mentioned movement of the knee lever **76** will also push up the link **48** to cause counterclockwise pivotable movement of the knife **57** for cutting the ribbon passing thereunder for a purpose which will also be covered below. Upon removal of a person's knee from the lever **76**, the coil spring **46** returns the lever **36** and all of the parts operatively connected thereto including the knee lever **76** to their original positions seen in FIGS. 1–4 ready for another movement of the knee lever to the right when desired.

A reciprocally movable carriage generally designated **90** comprises a horizontally disposed plate portion **91** having a pair of coextensive, forwardly extending, parallel fingers **92** and **93** and a transversely, centrally positioned depending post portion **95** which passes through the slot **11** in the table **7**. The portion **95** is bored for the passage of the threaded portion of the shaft **20** therethrough. A plate member **96** which is threadably secured to a ball-containing ball nut **97** which rides on the threads of the threaded shaft **20** is secured to the depending portion **95** by means of screws. The member **96** includes a portion **98** (see FIG. 2) which extends to one side beyond the depending portion **95** and which is provided with a cam surface **99**. The bottom of the portion **95** of the carriage also has a cam surface **101**. The depending portion **95** of the carriage **90** is also provided with a horizontal, transversely extending pin **103** extending therethrough which supports rollers **104** and **105** for rolling along the upper surface of the table **7** adjacent the slot **11** during reciprocal movement of the carriage thus to support the carriage together with the engagement thereof by the threaded shaft **20** during such movement and when the carriage is at rest.

The spaced fingers **92** and **93** of the plate portion **91** of the carriage **90** are ground across their lower surfaces back from the front ends thereof to the vertical, diagonal, co-planar stop surfaces **107** and **108**. The fingers are also ground down along the inner halves thereof to present a pair of co-planar, horizontally disposed, inner, lower surfaces **110** and **111** extending along the lengths of the fingers for reception along these surfaces of the outer fingers **112** and **113** of a thin sheet metal forked plate member **114**, which is fixedly secured to a block support **115** which is in turn secured to the table **7**, when the carriage **90** is near and also when it is at its forward position (see FIGS. 7 and 8). The upper surfaces of the fingers **112** and **113**, which are co-planar with each other, are somewhat lower than the upper surfaces of the outer parts **118** and **119** of the fingers **92** and **93**. The fork member **114** also contains inner fingers **120** and **121** which are bent up with respect to the outer fingers **112** and **113** for a purpose which will appear below. The upper surfaces of the outer parts **118** and **119** of the fingers **92** and **93** are also ground down from their forward ends rearwardly to stop surfaces **123** and **124**.

The carriage **90** is further provided with an upper plate member **127** having a transversely centrally located depending portion **128** which is pivotably mounted between a pair of rearwardly extending fingers **129** and **130** of the depending portion **95** of the carriage by means of a pin **131**. The forward portion of the depending portion **128** of the plate member **127** is cut back to produce a tapered formation of the lower part of the portion **128** so as to permit forward pivotal movement of such part about the pin **131** until the forward surface of this part abuts against the rear surface of the depending portion **95** of the carriage as seen in FIG. 12. A coil spring **135** is received within bores in the depending portions **95** and **128** of the carriage (see FIG. 1) which spring is compressed in the FIG. 12 tilted condition of the plate **127** and which returns said plate to its normal condition as seen in FIG. 1 when the carriage **90** is moved from the FIG. 12 to the FIG. 1 position. The plate member **127** is provided with a pair of forwardly extending, co-extensive parallel fingers **138** and **139** which are turned downwardly and thickened at the forward ends thereof for a purpose to be brought out below. The plate member **127** also has a rearwardly extending, tapered, downwardly bent terminal portion **142**.

The table **7** is also provided with a bracket member **145** near the rear thereof through which a nut and bolt combination **146** extends. A coil spring **147** is positioned on the bolt between the round head thereof and the bracket **145**. It should be observed from FIG. 12 that when the carriage **90** moves rearwardly until the depending portion **128** thereof engages the head of the bolt **146** continued rearward movement of the carriage causes clockwise rotation of the plate member **127** about the pin **131** as seen in FIG. 1 until the lower forward sur-

face 133 of the depending portion 128 engages the rear face of the depending portion 95 of the carriage.

A reversible electric motor 150 (see FIG. 3) is secured to the rear, depending portion 152 of a bracket member 151 by means of screws, the upper, horizontal leg of the member 151 in turn being secured to the plate 66. A toothed pulley 154 is mounted on the motor shaft which extends through said portion 152 of the bracket. A similar though smaller toothed pulley 155 is mounted on the rear end portion of the threaded shaft 20 and a timing type, toothed flexible belt 156 extends over both of said pulleys. The operation of the motor 150 in one direction, of course, effects turning of the threaded shaft 20 and consequent movement of the carriage 90 in one direction while a reversal of the direction of operation of said motor will effect rotation of the shaft 20 and consequently movement of the carriage in the opposite direction.

A limit switch 159 is mounted on the end of the supporting structure of the attaching machine (see FIG. 2) which switch has a roller 160 which rides on the hub 162 of a hand wheel 163 on the end of the shaft 164 of the fastener attaching machine which shaft turns whenever the machine is being operated. A button head socket cap screw 165 is received within the hub 162 to trip the limit switch 159 upon movement of the head portion thereof under the roller 160 of the switch during rotation of the machine shaft 164.

A ribbon feeding mechanism generally designated 167 comprises a bracket 168 mounted on the plate 66 which supports a reel 169 of colored ribbon on a headed shaft 170 extending through the vertical flange of the bracket 168. The reel 169 is resiliently biased against a spool spacer or washer member 171 by means of a coil spring 172 which is interposed between a collar 173, retained on the shaft by a hand actuated set screw 174, and a washer 175. The ribbon 177 passes through a guide member 178 secured to a block member 180 which is mounted to the plate 66. The block 180 contains bearing means for the shafts of the wheels 181 through 183. The wheels 181 and 183 have rubber peripheral portions which together with the ribbon passing thereover are received between the opposite (see FIG. 2) flanges of the center wheel or pulley 182.

An electric gear motor 184 is mounted on the plate 66 through a bracket 185, a one revolution clutch 187 being mounted on the motor shaft after the gearing thereof through an adaptor. The shaft 189 upon which the wheel 182 is mounted is connected to the clutch 187 for the driving of said wheel by the motor 184 when a projecting dog 188 and the portion 189 of the clutch from which it extends, which are normally held against rotation with the rest of the clutch by a detent 190, are permitted to rotate with the rest of the clutch by removal of the detent from engagement with the dog 188. The detent is part of a lever 191 which extends upwardly from and is pinned to a yoke 192 and a link 193 which latter is pinned to the armature portion of a solenoid 194. The lever 191 continues upwardly to terminate as a handle 195. A coil spring 196 attached between a plate 197 which is welded to the bracket 185 and the pin 198 normally retains the lever 191 together with the link 193 and the solenoid armature in a forward direction so that the detent 190 is engaged by the dog 188 of the clutch.

The solenoid 194 is secured to the plate member 66, a spacer 199 supporting the same at the proper height. The yoke 192 is secured to the spacer 199. Energization of the solenoid 194 will, of course, pull the armature and attached link 193 and the lever 191 to the right as seen in FIG. 2 thus to remove the detent or stop 190 from under the dog 188 of the one revolution clutch 187 to permit the clutch to drive the shaft 189 and consequently the wheel 182 and through it and the ribbon the wheels 181 and 183 to draw the ribbon from the reel 169 and feed it past the knife 57. The movement of the wheel 182 will, of course, be in a clockwise direction as seen in FIG. 2. The solenoid 194 is only energized sufficiently long by the closing of the switch 25 by the passage of the portion 98 of the member 96 of the carriage 90 thereover during movement of the carriage in a forward direction to withdraw the detent 190 from the dog 188 after which the spring 196 returns the members 191 and 193 to their normal positions to stop said dog upon the completion of one revolution thereof to disengage the clutch and prevent any further driving of the wheel 182 and feeding of the ribbon. The gearing of the gear motor 184 together with the diameter of the wheel 182 is such as to move a predetermined amount of ribbon in the forward direction before stopping thereof so that when the knife 57 is moved upon actuation of the knee lever 76 to the right as seen in FIG. 1 a predetermined length of ribbon will be cut off from the rest of the ribbon in the feeding mechanism and on the reel 169.

After the ribbon 177 leaves the wheels 182 and 183 it passes over a horizontal portion 201 of a sheet metal member 202 which is secured to the front face of the block 180 by screws. The ribbon next passes through the slot 75 between the members 60 and 68, under the normally raised knife 57, and therethrough a guide block 203, more particularly, through a horizontally disposed slot 204 therein which is open along the front thereof but normally covered by the depending leg 205 of a hinge 206 secured to the block 203 through the upper, horizontal leg of the hinge which slot is at the back and front thereof. The block 203 is secured to the table 7 by means of a bracket 207.

An L shaped member 209 is mounted for reciprocal vertical movement along the rear face of the guide block 203 by means of a plate 210 and a pair of cap screws 211 passing through the plate and a pair of annular spacers received within a vertical slot 212 in the vertical depending leg of the L shaped member 209. The slot 212 is such as to limit the downward movement of the member 209 to the position as shown in FIG. 10 while permitting this member to move vertically upwardly at least to the extent shown in FIG. 12. The horizontal leg or bar portion 214 of the member 209 has a lower horizontal surface which engages and rides up along the rear, downwardly turned portion 142 of the upper plate 127 of the carriage 90 and also along the normally horizontal upper surface of the member 127 during rearward movement of the carriage under said bar portion 214 for a purpose which will be seen presently.

An electrical static eliminator 216 is supported on the block 180 by means of a clip the outer end of which eliminator is adjacent to the ribbon as it passes over the portion 201 of the member 202 to neutralize the static charge that may be present in the ribbon.

A pair of transversely spaced, stationary bow forming assemblies 218 and 219 are supported in elevated positions above the table 7 by means of posts 220 and 221 in the case of the assembly 218; 229 and 230 in the case of the assembly 219. These assemblies comprise horizontal, co-planar plate members 223 and 224 respectively, which are the portions of the assemblies actually supported by and secured to said posts by means of screws as seen in the drawing. These posts are in turn secured to the table 7 by means of screws passing through the table from the underside thereof into said posts.

The plate 223 of the outer assembly 218 has a rearwardly extending narrow portion 225 having an inner, longitudinally extending edge 226 which is parallel to the threaded shaft 20 and also the longitudinal center line of the slot 11. The assembly 218 includes an upper plate member 227 which is screwed to the plate 223 so that the inner, straight edge 228 thereof is slightly spaced from and at least generally parallel to the outer straight edge of the plate member 91 of the carriage 90 when the carriage is in the position shown in FIG. 8, for instance. It is pointed out that said outer edge and also the opposite or inner straight edge of the plate mem-

ber **91** are generally parallel to the threaded shaft **20**, for instance. The plate **227** is adjustable inwardly and outwardly and also, to some extent, angularly, if desired, relative to the plate **223** upon the loosening of its attaching screws and moving of the same relative to these screws by virtue of slots in said plate through which the screws pass. The plate **227** is also provided with an inwardly and forwardly extending straight edge **231** as one progresses forwardly from the rear end thereof—the rear limit of which edge **231** is preferably over the edge **26** of the plate **223**.

The assembly **218** is further provided with a sheet metal member **232** which is bolted on top of the rear portion **225** of the plate **223**. The manner **232** has a generally U shape rear portion **233** with the rear leg extending further down than the forward leg as seen in FIG. 1. An L shape sheet metal member **234** is welded along its upper horizontal leg to the underside of the member **232** so that its other leg **235** depends adjacent said U shape portion of the member **232** in a longitudinally etxending fashion in the position as shown in FIG. 3. The U shape pocket portion **233** is located opposite the slot **204** in the guide block **203** so as to receive the ribbon **177** therewithin when the ribbon comes from said slot and across the space therebeyond to the U shaped pocket during the operation of the feeding mechanism **167** as can be appreciated from FIG. 10. An L shaped bracket **236** is secured to the table **7** with the vertical leg thereof extending parallel to the threaded shaft **20** and also opposite the slot **204** of the guide block **203**. This leg is positioned somewhat outwardly of the inward edge of the U shaped pocket and terminates at the top just short of said pocket. The purpose of the bracket **236** is to cause the ribbon **177** to bend down rather sharply as the same is fed out of the slot **204** and across the space between the same and the pocket **233**. The vertical leg of the bracket **236** together with said pocket **233** act to receive and retain the forward portion of the ribbon both during the feeding thereof and also when the movement of the ribbon has stopped for a purpose which will appear hereinafter. FIG. 10 shows the condition of the ribbon **177** when received by the pocket **233** and the vertical leg of the bracket **236**.

The plate member **223** is provided on the underside thereof adjacent the inner longitudinal edge **238** of the same with a downwardly extending flat pad portion **239** having a lower, flat, horizontal surface extending along its length. This pad portion terminates at the front in a slightly forwardly and inwardly extending, vertical, straight edge **240** for a purpose which will be brought out below. The plate **223** is also provided with an upwardly extending flat pad portion **241** which terminates at its rear in a rearwardly inwardly inclined vertical edge **242** for a purpose also to be brought out hereinafter.

The plate portion **224** of the inner assembly **219** has an inner edge **244** which is preferably parallel to the threaded shaft, **20** for instance. The plate **224** is also provided with a pad **245** on the upper surface thereof which terminates at the rear thereof in a rearwardly, inwardly extending straight edge **246** which is opposite and complementary to the edge **242** of the pad **241**. The plate **224** is also provided with a rearward, downwardly inclined portion **248** which has an inwardly forwardly extending straight edge **249** as one progresses forwardly from the rear end of said portion, such edge terminating at the inner edge **244** of the plate **224**. The plate **224** is longitudinally split or slotted from the rear end of the portion **248** forwardly at **251** to permit the downward bending of the portion **249** while the back, rearwardly extending portion **252** of the plate **224** continues in the same plane as the rest of the plate except for the portion **249** thereof. The portion **252** is turned up at the end at **253**.

A vertical, longitudinally extending plate portion **254** is welded along the top thereof to the inner edge of the portion **252** of the plate **224**, the portion **254** passing within the slot **251**. The plate portion **254** is also welded to the outer edge of the portion **249** of the plate **224** including the pointed rear end of the portion. A plate portion **255** extends rearwardly from the portion **254** and outwardly away from the longitudinal vertical plane containing the center lines of the threaded shaft **20** and carriage **90**. The top edge of the plate portion **255** is welded to the upturned portion **253** of the plate **224**, the portion **255** having an upwardly inclined top edge which extends along the underside of said portion **253**.

The inner assembly **219** further includes an upper plate member **257** which rests on the upper surface of the plate **224** being secured to said plate by screws. The plate **257** is transversely slotted for the passage of the screws to provide for transverse and also to some extent angular adjustment of said plate relative to the inner longitudinal edge of the plate **91** of the carriage **90** when the latter is in the forward position for instance. The plate **257** is ground up along the inner half thereof relative to said vertical center plane of the screw **20** and carriage inwardly of the line **258** and also at the end forwardly of the line **259** to produce an appreciable space or slot between the inner half of the plate **257** and the upper surface of the plate **224** for a purpose to be brought out hereinafter. The inner straight edge **261** of the plate **257** is slightly spaced from and at least generally parallel to said inner longitudinal edge of the plate **91** of the carriage **90** when the latter is in the forward position for instance. The upper surface of the plate **257** is horizontal and coplanar with the upper surface of the plate **227** of the assembly **218**, the upper surface of the plate **224** except for the portion **248** thereof also being horizontal and coplanar with the upper surface of the plate **223** of the assembly **218**. The rear inner corner **262** of the plate **257** is bent up for a purpose which will appear presently.

Considering the operation of the bowmaking device and first the bowmaking function thereof and assuming the main switch of the electrical system of the device to be closed and starting with the position of the parts as shown in FIGS. 1–4, movement of the knee lever **76** to the right as seen in FIG. 1 causes downward movement of the forward end of the knife **57** which cuts off the ribbon extending outwardly of the knife from the rest of the ribbon in the device. Such movement of the lever **76** also causes the limit switch **41** to be swung down away from the switch tripping engagement with the bottom of the depending portion **95** of the carriage **90** adjacent the cam **101** thereof to allow the finger of the switch to extend to place the normally closed switch in a closed condition. The closing of this switch **41** completes a circuit through the motor **150** to turn the threaded shaft **20** by means of the pulleys **154** and **155** and the belt **156**. Said movement of the lever **76** further causes the mechanical stop member **28** to be moved down to release the carriage. It should be noted that the ribbon is supported across the upper surfaces of the outer finger portions **118** and **119** of the plate member **91** of the carriage **90** and against the stop surfaces **123** and **124** thereof and that the turned down, thickened front end portions of the plate member **127** of the carriage hold the ribbon against said finger portions under the action of the coil spring **135**. The ribbon is therefore held or clamped by the carriage **90** in the FIG. 1 position of the latter and as the same moves forwardly after the cutting of the ribbon by the knife **57**.

As the carriage **90** moves forwardly the lower part of the outwardly extending portion **98** of the member **96** of the carriage momentarily passes over and depresses the roller and finger of the limit switch **25** which completes a circuit to and thus energizes the solenoid **194**. This causes removal of the detent **190** from the clutch dog **188** which allows the one revolution clutch **187** to drive the wheel **182** and through it the rollers **181** and **183** to feed a new and predetermined length of ribbon outwardly of the knife **57** in the manner above explained whereupon

one revolution of the clutch having been completed, the detent **190** engages the dog **188** to arrest the feeding of the ribbon.

It is pointed out before going further that the operator removes his knee from the knee lever **76** has soon as the carriage has moved forwardly a short distance, after which removal the spring **46** (see FIG. 2) acting on the lever **36** returns all the parts operatively connected to this lever to the positions thereof shown in FIGS. 1–4, that is, in the normal positions thereof. It is also pointed out that the initial movement of the carriage **90** in the forward direction causes the outer part **267** of the cut off piece of ribbon **265** which is received within the U shaped pocket **233** to pull out of the pocket with the assistance of the depending plate portion **235**, the upper part of said outer part of the piece of ribbon riding along the inner edge **226** of the plate **223** while the opposite or inner portion of the piece of ribbon pulls out the slot **204** in the guide block **203** through the open front of the slot swinging the free depending leg **205** of the hinge **206** forwardly to permit such pulling out of the piece of ribbon from said slot, said inner portion of the ribbon making contact with the outwardly inclined plate portion **255** when reaching the same during further forward movement of the carriage **90**. This inner and depending portion of the piece of ribbon is moved towards the carriage as it engages along the plate portion **255** until the plate portion **254** is reached after which this ribbon portion rides along said plate portion until the point of the downwardly inclined portion **249** of the plate **224** is reached.

When the carriage **90** has moved the ribbon piece **265** to the rear end of the plate **227** and continues forwardly beyond this point, the upper portion of the outer part of the ribbon is caused to be moved inwardly towards the longitudinal center line of the carriage by the riding thereof along the inclined edge **231** of said plate **227**. When the ribbon has been moved past the edge **231** said upper portion of the outer part of the ribbon piece then rides along the inner edge **228** of the plate **227**. When the ribbon has moved just beyond the inclined edge **231**, the outer portion or leg **267** of the ribbon is bent down by the engagement thereof with said edge **228** substantially as shown in FIG. 5 in full lines. Continued forward movement of the carriage then brings a somewhat lower portion of the outer leg of the ribbon into engagement with the inclined edge **264** of the plate **223** which causes an inward folding of outer leg **267** as the leg engages along said edge **264**. The phantom lines in FIG. 5 illustrate the outer leg **267** of the ribbon in the course of its riding along the edge **264** and being inwardly folded as a result thereof. When the carriage **90** has moved the ribbon leg **267** beyond the inclined edge **264** such leg has been folded up into a position against the undersurface of the finger **92** of the plate portion **91** of the carriage with the rear edge of the leg either slightly forward of or resting against the stop surface **107** thereof. This leg of the ribbon also is, or subsequently will be, when the end thereof passes within the space between the plates **224** and **257** and the second leg is folded up, resting against the undersurface of the finger **93** of the plate portion **91** of the carriage with the rear edge of the leg either slightly forward of or resting against the stop surface **108** thereof.

During the folding process of this outer or first leg **267** of the ribbon and subsequent thereto, the upper portion of this leg which has engaged the rear portion **268** of the inner edge **228** of the plate **227** before the start of the folding of the leg continues to engage and ride along said edge **228** while the portion of the ribbon leg thereunder is caused to fold or bend inwardly about said portion which rides along said edge **228**. This folding or bending together with a similar folding or bending of the inner leg of the ribbon to be covered presently establishes the length of the bow except for projecting ends thereof.

When the inner or second leg **269** of the ribbon piece **265** reaches the rear end of the inclined edge **249** of the plate **224**, a mid portion of said leg begins, and increasingly continues, to be turned inwardly towards the aforesaid vertical plane containing axis of the threaded shaft **20**, for instance, as the same rides along said edge **249** to produce a folding of this inner or second leg of the ribbon when it reaches the inner surface **244** of the plate **224**. The upper part of the inner or second leg **269**, after it has ridden along the plate portion **254**, engages the under or inner surface of the turned up corner **262** of the plate **257** until the inner edge **261** of the plate is reached, which edge is equivalent to the edge **228** of the plate **227**, after which said upper part of the ribbon leg rides along said edge **261** as did the opposite leg ride along the edge **288**. Such riding of the upper part of said leg along the surface **261**, of course, together with the inward moving of the leg caused by the edge **249** of the plate **224** causes folding or bending of the leg **269** about such portion of the ribbon engaging along said edge **261** thus to establish the length of the bow together with the bending previously mentioned about the portion of the ribbon engaging along the edge **228** of the plate **227**.

FIG. 6 illustrates in full lines the inner or second leg **269** of the ribbon piece in the course of its riding along the edge **249** of the plate **224** and also the edge **261** of the plate **257** during its folding. The phantom lines in FIG. 6 show this leg of the ribbon completely folded up when the carriage has moved this leg beyond the edge **249** of the plate **224**. FIG. 6 also shows the first leg fully folded up with the end thereof entering the space between the plates **224** and **257**. Such ribbon end moves along within this space during the rest of the forward movement. The second leg **269** of the ribbon normally rides along at least the inner part of the under surface of the depending pad portion **239** of the plate member **223**.

It will be observed from FIG. 7 that the legs **267** and **269** of the ribbon rearwardly inclined and also cross each other rearwardly of the main portion **270** of the ribbon between the legs as the result of dragging of the two legs along the plates **223**, **224** and **257** along which they move after the folding thereof.

As the carriage nears the end of its forward movement, the outer fingers **112** and **113** of the stationary fork member **114** ride along the upper surfaces of the inner portions **110** and **111** of the plate **91** of the carriage **90** and under the ribbon portion **270** which extends between the clamping fingers of the carriage **90**. The inner and upwardly extending fingers **120** and **121** pass above said portion **270** of the ribbon piece so as to cause said ribbon piece to enter and pass along the two slots or spaces **271** and **272** of said fork member **114** until said ribbon portion reaches the ends of these slots as shown in FIG. 7. Continued forward movement of the carriage **90** into the end limit of movement thereof shown in FIG. 8 causes a certain forward bending of the outer portions **273** and **274** of the ribbon portion **270** into engagement with the stop surfaces **242** and **246** of the raised pads **241** and **245** respectively, of the plates **223** and **224** respectively.

Inasmuch as no stop is provided on the carriage **90** for preventing rearward movement of the second leg **269** of the ribbon piece, the forward, inclined edge **240** of the pad **239** of the plate **223** constitutes such a stop surface for said second leg of the ribbon which springs up in front of this edge **240** when this leg moves past the same just slightly before the carriage stops. In the condition of the ribbons shown in FIG. 8 certain stresses are present within the same which if not resisted would cause the ends of the legs **267** and **269** thereof to move rearwardly to relieve such stresses.

The stop surface **240** just mentioned and also the two diagonal, co-planar edges **107** and **108** of the fingers of the carriage plate **91**, especially the edge **108**, prevent such rearward movement of the legs **267** and **269** of the ribbon when in the stressed condition shown in FIG. 8. Moreover, said edges **240**, **107**, and **108** are so disposed as to

hold said ribbon legs opposite each other and at equal but opposite rearward inclinations. It is particularly important to note that in the FIG. 8 condition of the ribbon the center lines of the legs thereof cross above and below each other along the longitudinal, vertical center plane of the carriage **90** and also below the center line of the portion of the ribbon part **270** between the slots **271** and **272** of the fork member **114** and further also immediately under the centers of the punch and die assemblies **2** and **3** of the fastener attaching machine.

The operator then causes the fastener attaching machine to operate to bring the two parts of a fastener combination together through the three pieces of the bow and a portion of a garment after having placed the portion of the garment over the bow in a desired position so as to cause the bow to be fastened together and to said garment. The garment portion is then moved rearwardly to remove the bow thus formed from the fingers of the fork member **114** after, however, the carriage **90** moves rearwardly (to the right as seen in FIG. 1) sufficiently to remove the fingers **92** and **93** of the carriage **90** from within the loops of the fastened bow while the garment portion and attached bow are held against movement.

The carriage **90** was stopped in its forward movement by engagement of the depending portion **95** thereof with the bearing block **18**.

During the time the carriage **90** is in the forwardmost position, the electrical current continues to pass through the motor **150** although the armature thereof remains stationary.

Actuation of the fastener attaching machine for one cycle of operation causes the shaft **164** of the machine to rotate which in turn causes the button head **165** to rotate underneath the roller **160** of the limit switch **159** thus closing this normally open switch which effects a reversal of the direction of operation of the electric motor **150** which then causes the carriage **90** to move in a rearward direction. Such rearward movement causes passage of the cam surface **99** of the carriage over the roller of the limit switch **25**. However, the solenoid **194** is not energized for a reason which will be brought out hereinafter when reference is made to the wiring diagram.

As previously noted, a new length of ribbon has been automatically fed outwardly of the knife **57** through the guide block **203** and across the space between the same and pocket **233** and bracket **236** (see FIG. 10). Continued rearward movement of the carriage **90** causes the pointed, rear, downwardly inclined end portion **142** of the upper plate member **127** to pass under the ribbon, and also the bar portion **214** of the L shaped member **209** to cause the latter to push the ribbon up such depending ramp portion **142** and then along the top surface of the plate member **127** as the carriage continues to move rearwardly until the ribbon is pushed off the forward ends of the fingers **138** and **139** of the member **127** and onto the forwardly projecting fingers **92** and **93** of the plate member **91** therebelow at the very end of the rearward movement of the carriage **90** at which time the upper plate **127** has been tilted upwardly in a manner previously explained. FIG. 11 shows the ribbon being pushed up the ramp portion **142** by the bar portion **214**.

Referring now to the wiring diagram of FIG. 13, **280** and **281** are power lines from an alternating current source while **282** is the main line switch. Wires **283** and **284** are continuations of the power lines. The normally closed but held open limit switch **41** is located near the upper end of the wire **284**. The static eliminator **216** and ribbon feed motor **184** are connected across the wires **283** and **284** by means of wires as shown and operate as long as the switch **282** is closed. Normally open limit switch **25**, normally closed latch relay contacts **285** and a first latch relay coil **286** of a latch relay **287** are connected across the wires **283** and **284** by means of wires **288** through **293**. The normally open limit switch **159**, normally open latch relay contacts **295**, and the first latch relay coil **296** of the latch relay **297** are connected between the wires **283** and **284**, wires **298** through **301**, **292** and **293**. A push button switch **303** is also connected between the wires **283** and **300** by wires as shown. The normally open limit switch **26** and a second latch relay coil **305** are connected between wires **283** and **284** by wires **306** through **308**, and wire **283**. A second latch relay coil **309** of the latch relay **287** is connected in parallel with the coil **305** by wires as shown. The normally open latch relay contacts **311** of the latch relay **297** and the motor relay coil **312** are connected between the wires **283** and **284** by wires as shown. The reversible carriage moving motor **150** is connected between the wires **283** and **284** for one direction of operation thereof by wires **313** through **315** through the motor relay contacts **316** between the wires **313** and **314**, which contacts open when the carriage **90** is in its rest position shown in FIGS. 1–3. The motor **150** is connected between the wires **283** and **284** for the opposite direction of rotation thereof by wires **313**, **317**, **318**, and **315**; the motor relay contacts **319** which are closed when the carriage **90** is in its rest position. A capacitor **320** of ample size is connected between the wires **314** and **318**. To complete the wiring the solenoid **194** is connected between the wires **290** and **284** by wries as shown.

Considering the operation of the bowmaking device with special reference to the wiring diagram of FIG. 13, as above stated closing of the main switch **282** energizes the static eliminator **216** and ribbon feed motor **184**. Upon movement of the knee lever **76** to the right, as seen in FIG. 1, which causes a lowering of the limit switch **41** to permit its closing, the motor **150** is energized through the closed relay contacts **319** in one direction of rotation thereof. This causes movement of the carriage **90** in the forward direction. It should, of course be appreciated that the mechanical stop assembly **28** is also moved downwardly out of the way to permit said movement of the carriage forwardly when the knee lever **76** is moved to the right as previously explained.

As the carriage **90** moves forwardly, the normally opened limit switch **25** is closed during the passage of the carriage thereover to cause the current to pass through the closed latch relay contacts **285** of the latch relay **297** and also the relay coil **286** and solenoid **194**.

Energization of the solenoid produces the feeding of the ribbon as previously explained. Energization of the latch relay **286** causes closing of the normally open latch relay contacts **295**.

After the carriage **90** has moved to its forward location, operation of the fastener attaching machine causes the button head **165** to move under the roller **160** of the normally open limit switch **159** to close the same. Inasmuch as the latch relay contacts **295** are now closed, the current passes through the latch relay coil **296** which causes the opening of the relay contacts **285** and also the closing of the relay contacts **311** to energize the motor relay coil **312**. The energization of such relay coil causes closing of the motor relay contacts **316** and opening of the contacts **319** to produce reversal of the direction of operations of the motor **150**. This reversal of the motor, of course, causes movement of the carriage **90** in the rearward direction.

Movement of the carriage rearwardly with the passage of the cam surface **99** thereof over the roller of the limit switch **25** does not cause a second energization of the solenoid **194** inasmuch as the latch relay contacts **285** of the latch relay **297** are now open. Movement of the carriage **90** rearwardly past the switch **41** does not trip and open the same inasmuch as such switch is a one-way microswitch which trips only when the carriage moves forwardly thereover. When the cam surface **99** of the carriage **90** depresses the roller of the limit switch **26** to close this normally open switch, the consequent flow of current through the latch relay coil **305** causes a closing of the relay contacts **285** and an opening of the relay contacts **311** of the latch relay **297** which latter

opening causes deenergization of the motor relay coil **312** to open the motor relay contacts **316** and close the contacts **319** to again reverse the direction of operation of the motor **150**, thus returning the motor to is original direction of rotation to move the carriage in a forward direction. Closing of the limit switch **26** also causes current to flow through the coil **309** which effects an opening of the contacts **295** of the latch relay **287**. Tripping of the limit switch **41** during forward movement of the carriage **90** which opens the switch arrests the operation of the motor **150**, thus bringing the movement of the carriage to a stop together with the functioning of the mechanical stop **28**, thus completing a cycle of operation of the bowmaking device and returning the carriage **90** to its rest condition shown in FIGS. 1–3.

It is most important to point out that the existence of the contacts **295** of the latch relay **287** with the same being open when the carriage **90** is in its normal rest position permits the fastener attaching machine to be operated independently of the bowmaking device; that is, when no bow has been formed and positioned ready for an attachment therethrough, by the pressing of the foot treadle. The rotation of the machine shaft **164** during the operation of the machine will not affect the bow making device because of the open contacts **295**. The attaching machine may, of course, be operated as many times as desired without employing the bow making device and, of course, without affecting the same. When it is desired to use said device for the placing of a couple of fasteners with bows on the upper part of a child's sleeping garment, for example, the knee lever **76** is, of course, moved to the right as previously covered to set the bow making device in operation. Movement of the carriage **90** forwardly over the limit switch **25** effects closing of the contacts **295** as previously covered to permit reversal of the motor **150** upon the closing of the switch **159** when the fastener attaching machine is operated to secure a bow.

Should it be desired for any reason to return the carriage from the forward position without making a fastener attachment, the push button **303** may be closed which has the same result as the closing of the switch **159**.

The lever **195** is moved to the right as seen in FIG. 2 after the carriage **90** has been moved into its forward position and the switch **282** has been opened, to allow the ribbon from a new reel which has been placed on the reel holder to be placed around and between the wheels **181–183** in the pattern shown in FIG. 2 with the turning of the wheels by hand and also through the slot **75** of the block members **60, 68** after removal and replacement of the latter hold-down member and within the slot **204** of the guide block **203**. The lever **195** is then released, the switch **282** closed and the ribbon fed a couple of times by moving said lever to the right and releasing the same. The push button **303** is then pressed to return the carriage **90** to its normal rest position shown in FIGS. 1–3. The bowmaking device is now ready to operate for the making of bows in the manner above described.

It is thus seen that a very effective bow making device has been presented in which the bowmaking operations on a piece of ribbon are automatically performed by cooperating stationary and moving surfaces and means as a carriage moves the piece of ribbon in a single, rectilinear direction. An important feature of the present invention is the automatic feeding of a new length of ribbon, during movement of the carriage in said single rectilinear direction, into a position in which it is picked up by the carriage during the opposite return rectilinear movement thereof, the ribbon also being automatically positioned and clamped within the carriage by the time the same comes to rest at the end of the cycle of operation thereof ready for the start of a new cycle of operation thereof with the automatic cutting off of a predetermined length of the ribbon.

Thus, to restate it briefly a simple rectilinear movement of a carriage automatically and simply produces a bow which is fastenable to a garment, with the co-operation of stationary surfaces and means while a new length of ribbon is automatically fed into position during this movement of the carriage after which this length of ribbon is automatically picked up and placed in a predetermined clamped position on the carriage on its return rectilinear movement and movement onto its rest position. Such operation is most efficient and timesaving, permitting the making of many times the number of bows made by any prior device in a given time period and in a far simpler and trouble-free manner without the use of complex manipulating fingers and movement of a ribbon piece around in a rotary direction to a number of stations where the movement stops each time and manipulation of the ribbon takes place.

Although the disclosed bowmaking device is used with a fastener attaching machine, other means including independent, portable, hand device or means, of securing the bow together at the center alone or to a garment, for example, may be employed if desired. For instance, the bow may be stitched together or to a garment. Securing the parts of the bows together near the center thereof or to a garment for instance, is necessary for the production of a finished bow which will remain in the bow form upon removal from the bowmaking device. Means such as the fastener attaching machine which co-operates with the bow forming device to secure the bow together at the center after being specially prepared by said device for such securing is accordingly in combination with the bowmaking device. Of course, bows formed by said device could also be secured together at the centers thereof, or to a garment, for instance, by the use of a hand device or means.

Fastener combinations may also be secured through the centers of bows alone, which bows in turn may be snapped onto other fastener combinations which have been secured to a garment or other article, should this manner of attachment of the bows to a garment or other article be desired.

Although the bowmaking device has been disclosed as including a static eliminator, such an eliminator is not essential for all ribbon that may be employed and/or for all humidity conditions in the room.

Although a specific construction has been disclosed in the drawing and detailed description, variations and modifications of the same may be had and are in fact had in mind; other embodiments of the inventions are also had in mind. The appended claims therefore should be limited only by their own terms construed liberally.

What is claimed is:

1. A bowmaking apparatus comprising stationary means and ribbon holding means mounted for reciprocal movement between a first position for receiving a ribbon and a second position for finishing a bow, said ribbon holding means including means for receiving a central segment of a predetermined length of ribbon at spaced points thereon substantially transverse to the path of movement of said ribbon holding means with the opposite end segment of the ribbon extending from opposite sides thereof, said stationary means being disposed at said second position and extending along the path in which said ribbon holding means moves toward the second position and including surfaces disposed along the said path which cooperate with said ribbon holding means to fold the opposite end segments of the ribbon under the central segment of the ribbon during the movement of the ribbon holding means from the first to the second position, means adjacent said first position for feeding a predetermined length of ribbon to the ribbon holding means, a first control means for initiating movement of the ribbon holding means from the first position with a piece of ribbon, and a second control means for initiating movement of the ribbon holding means from the second position back to the first position.

2. A bowmaking apparatus according to claim 1 wherein the stationary means includes means at the second position for aligning the central and opposite end segments of the ribbon.

3. A bowmaking apparatus according to claim 1 including at the second position means for affixing a predetermined point of the central segment of the ribbon to underlying points of the opposite end segments of the ribbon, thereby completing the bow.

4. A fastener attaching machine having bow making apparatus according to claim 3 wherein the means for affixing the central and end segments of the ribbon is a fastener attaching device for securing the complementary parts of a fastener to opposite faces of a bow construction including the central and opposite end segments of the ribbon and the material, if any, to which the bow may be attached.

5. A bowmaking apparatus according to claim 1 wherein said first control means includes a lever actuating a cutter in the ribbon feeding means, means to release the ribbon holding means from said first position, a switch for electrically actuating means for moving said ribbon holding means toward the second position, and an actuating lever for initiating movement of said lever for actuating said cutter, said release means, and said switch.

6. A bowmaking apparatus according to claim 3 wherein said second control means includes means for the operator to initiate operation of the means for affixing the segments of the ribbon to each other, and means operable by said affixing means to initiate the movement of the ribbon holding means from the second position to the first position.

7. A bowmaking apparatus according to claim 1 wherein said ribbon feeding means feeds a predetermined length of ribbon at the first position across the path of movement of the ribbon holding means after the last-mentioned means has left the first position, the ribbon holding means being provided with surfaces adapted to guide the ribbon into position thereon as the ribbon holding means returns to the first position.

8. A bowmaking apparatus according to claim 7 wherein said surfaces adapted to guide the ribbon are provided by a plate on said ribbon holding means which rides under the ribbon as the ribbon holding means returns to the first position.

9. A bowmaking apparatus comprising a carriage movable between two points, means at the first of said points for feeding a piece of ribbon across the path of movement of the carriage, means which fold the opposite ends of the ribbon under the central segment of the ribbon during the movement of the carriage from the first to the second point, means at the second point for affixing the central segment of the ribbon to the folded-over ends thereof thereby providing a bow, and guide means which place a piece of ribbon of predetermined length on the carriage during return of the carriage from the second position to the first position.

10. A bowmaking apparatus comprising a carriage movable between first and second positions, said carriage having means for receiving and holding a length of ribbon thereon, a ribbon feeding means at the first position for feeding a length of ribbon to the carriage and cutting it off, means extending between the first and second positions for folding the ends of the ribbon on the carriage under the middle of the ribbon on the carriage, fastener attaching means located at the second position for affixing the ends of the ribbon to the middle portion thereof, first control means for initiating the movement of the carriage from the first position to the second position, and second control means for initiating the return of the carriage to the first position, said last-mentioned control means being actuated by said fastener attaching means.

11. A bowmaking apparatus comprising a carriage movable between a first and a second position, said carriage including spaced fingers for receiving a piece of ribbon on the upper surfaces thereof, the central segment of the ribbon being disposed on the fingers, means on said carriage for engaging the ribbon and holding it on the fingers, means disposed intermediate the first and second positions providing surfaces for folding the ends of the ribbon under the central portion of the ribbon during the movement of said carriage from the first to the second position, means at the second position which align the central portion of the ribbon and the opposite ends thereof so that they may be secured in a bow configuration, ribbon feeding means at the first position, first control means which initiate movement of said carriage from the first to the second position and actuate the feeding means and actuate means which cut the ribbon at a predetermined length, and second control means which initiate the return movement of said carriage from the second position to the first position, said carriage including means for engaging the ribbon and guiding it to the fingers during the return from the second position to the first position.

12. A device comprising, in combination, snap fastener attaching means and a bowmaking apparatus, said bowmaking apparatus including a carriage movable between a ribbon feeding position and a fastener attaching position, ribbon feeding means at said ribbon feeding position, control means which initiate movement of said carriage from the ribbon feeding position to the fastener attaching position, means disposed along the path of movement of said carriage which cooperate with said carriage to fold the opposite ends of the ribbon under the central segment of the ribbon, means at the fastener attaching position which hold the opposite ends of the ribbon under the central segment thereof and position the central segment in the path of operation of the fastener attaching means, and control means actuated by the fastener attaching means which cause the return of said carriage to the ribbon feeding position, said carriage having means for engaging and holding a piece of ribbon previously fed by the ribbon feeding means during the return of the carriage to the ribbon feeding position.

13. A bow forming apparatus comprising a stationary housing, a ribbon holding and transporting carriage mounted on the housing for linear, reciprocating travel with respect to the housing between first and second stop positions, the housing and carriage having interacting, generally planar facing surfaces which cooperate to fold the ribbon into a bow configuration as the carriage travels from the first to the second stop position at which position the formed bow is removed from the carriage, carriage driving means, and a device located adjacent the first stop position for feeding a predetermined length of ribbon across the path of travel of the carriage which device is activated by the carriage as it travels towards the second stop position, whereby another length of ribbon is engaged by the carriage on its return to the first stop position.

14. A bow forming apparatus according to claim 13 including means located adjacent the second stop position for securing the ribbon in a bow configuration.

15. A bow forming apparatus according to claim 14, including first control means, said first control means comprising an activating lever which is connected to a ribbon cutter associated with the ribbon feeding device, a mechanical stop member which retains the carriage in the first stop positions and a switch, the closing of which activates the carriage driving means, whereby actuation of said lever by an operator activates said ribbon cutter, releases said mechanical stop member and closes said switch thereby activating the driving means for movement of the carriage towards the second stop position.

16. A bow forming apparatus according to claim 15 including second control means, the second control means comprising means for the operator to initiate operation of the means for securing the ribbon and means actuated by the securing means which activates the carriage driving means to return the carriage to the first stop position.

17. A bow forming apparatus according to claim 13, wherein the ribbon holding and transporting carriage includes means for receiving and holding the central segment of the predetermined length of ribbon at spaced points thereon transverse to the direction of travel of the carriage with the end segments of the ribbon extending from opposite sides thereof whereby the interacting surfaces of the carriage and the stationary housing cooperate to fold the end segments under the central segment as the carriage travels from the first to the second stop position.

18. A bow forming apparatus comprising a stationary housing, a carriage mounted on the housing and linearly movable with respect to the housing between two stop positions, means at the first of said positions for feeding a piece of ribbon to the carriage, cooperating means on the stationary housing and carriage operable during the movement of the carriage from the first to the second position to fold the end segments of the ribbon under the central segment thereof, means at the second position to affix the central segment of the ribbon to the folded-

over end segments thereof, thereby forming a bow which is removed from the apparatus, and means operable during travel of the carriage from the first to the second stop position to cause another piece of ribbon to be fed to the carriage.

References Cited

UNITED STATES PATENTS

2,884,169	4/1959	Sperry	223—46
2,933,223	4/1960	Kravig et al.	223—46
3,129,861	4/1964	Napier	223—46
3,136,459	6/1964	Mashburn	223—46
3,223,299	12/1965	Kerrigan	223—46

FOREIGN PATENTS

1,020,437	2/1966	Great Britain.

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